DAIMLERCHRYSLER

ETC Technology

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Overview

1. Autonomous Toll Systems
2. German Toll Collect – System Overview
3. German Toll Collect – Status

1. Autonomous Toll Systems

Traffic Gridlock?

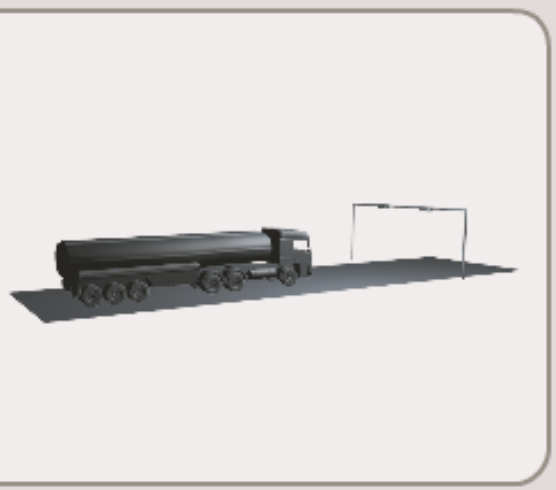
Traffic Management

Infrastructure Adaptions

Road Pricing

Two Options

Beacon/Booth



Autonomous

Reasons for using ETC Systems

- Private Road Owners
  - to get as much income as possible for refinancing of investments
  - to increase the throughput compared to manual tolling
  - to grant easy access an to increase user acceptance of tolled roads
- Public Authorities (Finance Ministries)
  - to get more income in comparison with flat rated vehicle taxes or toll stickers and to generate revenues on a pay-as-you-drive basis
  - to generate income from national and foreign vehicles
- Public Authorities (Transport Ministries)
  - to improve traffic flow on the existing road network by influencing driver behavior
  - to avoid traffic obstacles like toll plazas
  - to avoid traffic deviation to untolled roads

Key Factors Influencing ETC Architectures (Private Roads)

- Private road owners do not have access to any flat rated tax neither from trucks nor from passenger cars
- Typical private road owners hold only small parts of the total road network with high traffic volumes
- Private road owners levy tolls on all vehicles using their infrastructure
- Private road owners require
  - low-cost vehicle units
  - less flexibility for traffic management or extension of network

→ Private road owners require features which beacon based ETC systems may provide

Key Factors Influencing ETC Architectures (Public Roads)

- Public authorities have the option to toll the whole road network
  - Diverse road types and classes in network
  - Diverse traffic volumes and
- Public authorities require
  - More tariff options (e.g. time of day based, congestion pricing)
  - Systems allowing extensions to other road and vehicle classes
  - Traffic management and public safety functions

→ Public authorities will find that autonomous ETC systems will better serve their requirements especially in the long run

Key Features of Autonomous ETC Systems

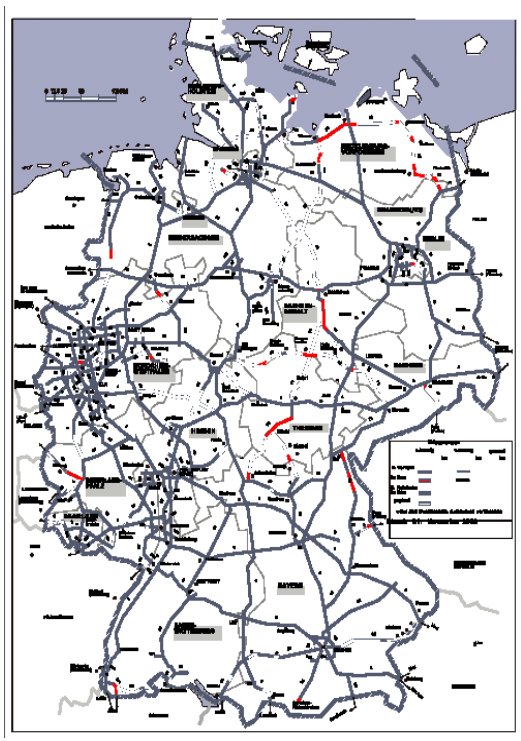
- Complete set of tariff models including area pricing and time based pricing
- Easy extension of toll road network possible without additional infrastructure
- Very limited need for road side equipment
- High level of anonymity and data protection
- Significant cost reduction for on-board equipment expected
- On-board eqiuipment can be used for Telematics services (e.g. safety and productivity services)

The Future View: Advanced Features of Autonomous ETC Systems

- System supports multiple tariff models
  - Combination of distance based charging and area pricing
  - Vehicle Miles Traveled (VMT) approach supported
  - Fees adapted to time of day and traffic load on road network
- Very cost efficient and convenient on-board equipment available
  - Tolling application running on standard in-vehicle systems
  - Plug and play on-board equipment for retro-fit purposes
- Integration of Telematics services
  - Real time traffic information is gathered in the vehicles and reported to others
  - Inter-vehicle hazard warning implemented in large scale (Vehicle Infrastructure Integration)
  - Hazardous goods transports are monitored everywhere
  - Sensible locations (e.g. tunnels) are managed using slot allocation

1. Toll Collect - System Overview

ETC - Germany
General Conditions



General conditions for ETC - Germany

- Replacement of Euro-vignette (time-depending toll)
- complex road net (13,000 km, more than 2,500 segments)
- high volume of traffic (approx. 1.4 Mio tolled vehicles)

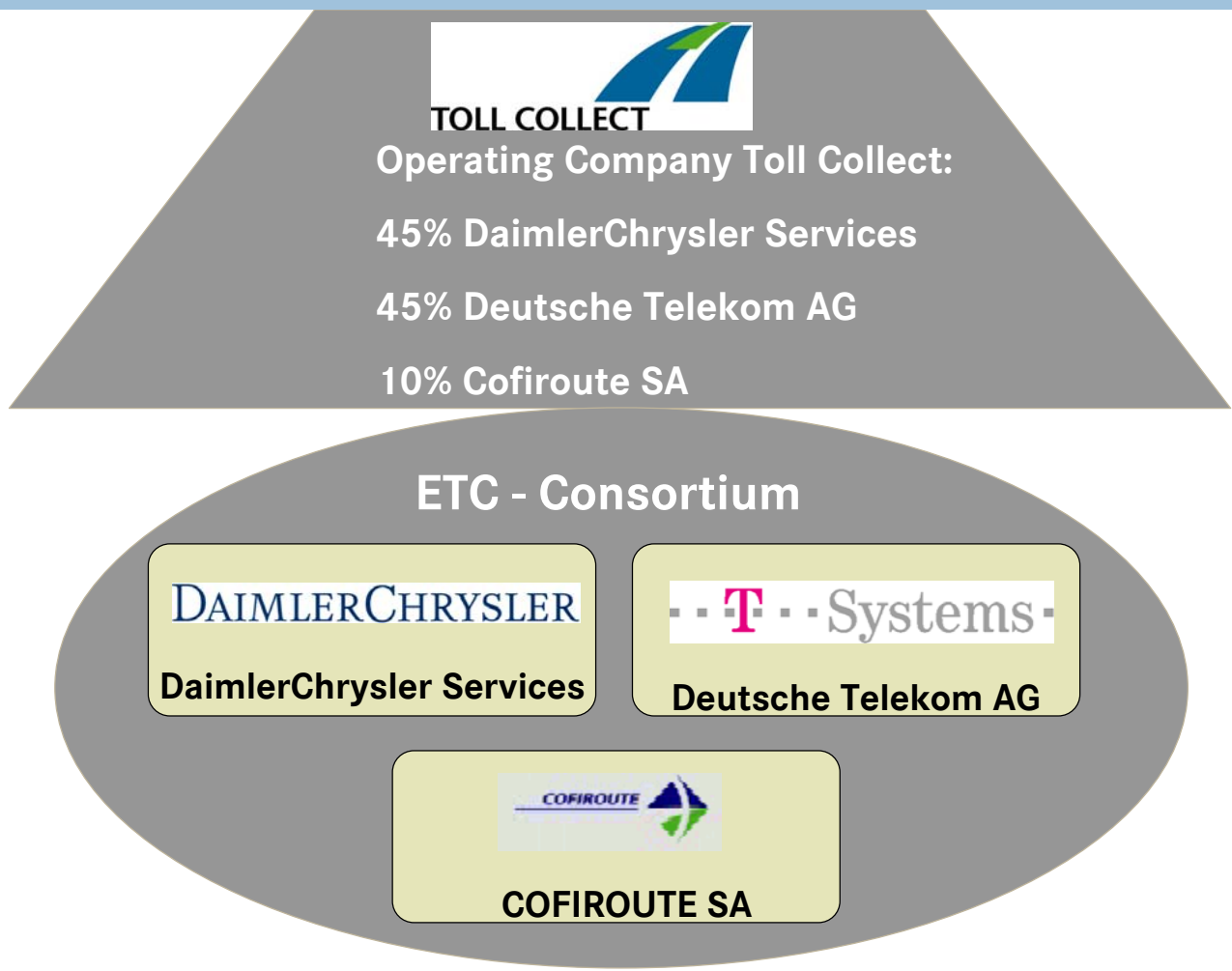
Requirements of German Government

- PPP - model: conception, implementation, operation
- levy of usage-depending toll
- for trucks >=12t
- dual system / non-discriminating for occasional users
- interoperability with toll systems of neighbourhood countries

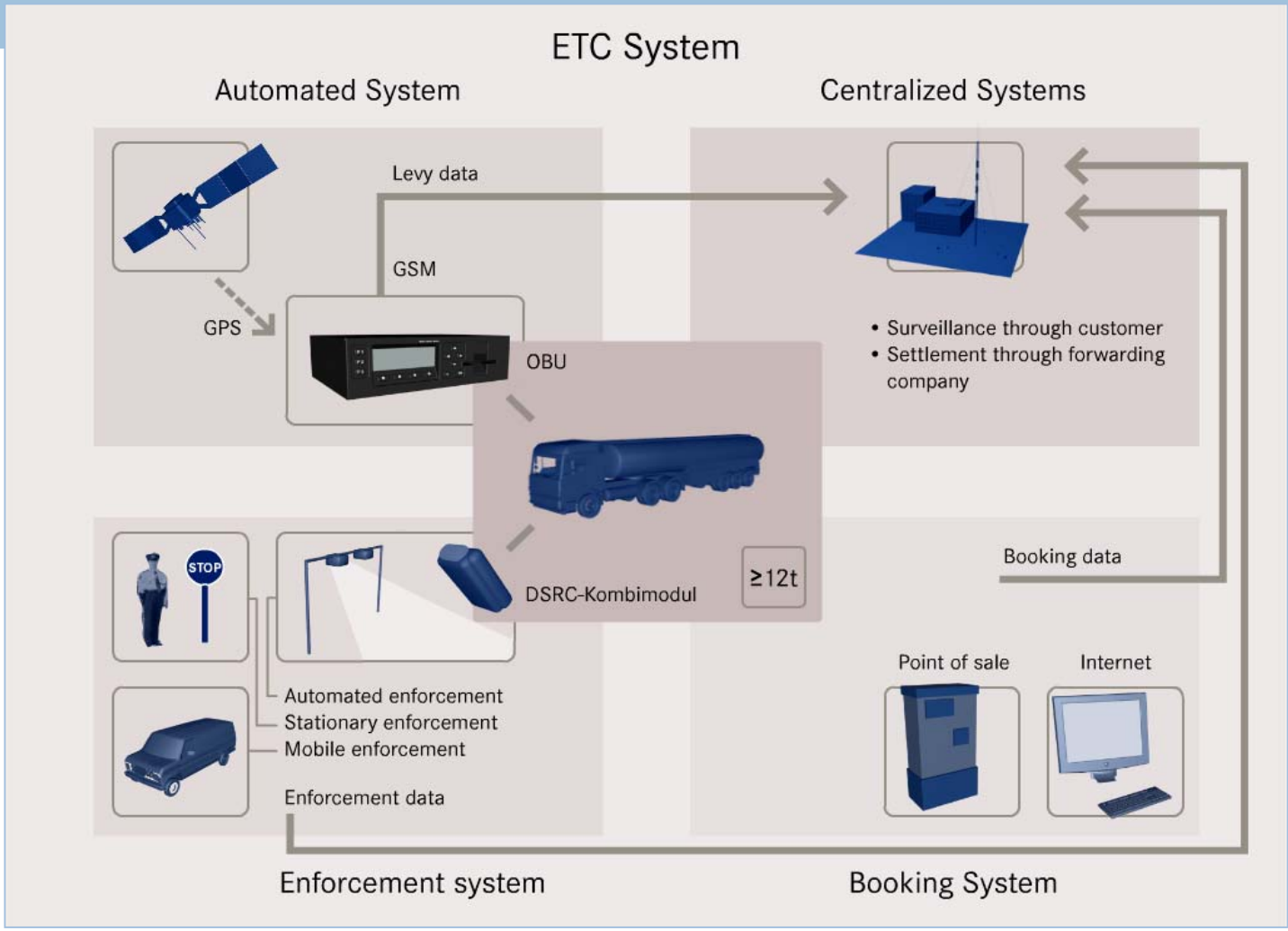
Time schedule

- start of tender	07/2000
- first bid	01/2001
- start of operation	1 January 2005
- duration of concession	12 years

ETC - Germany
Consortial Set-up



ETC Germany - System Components



Automated System

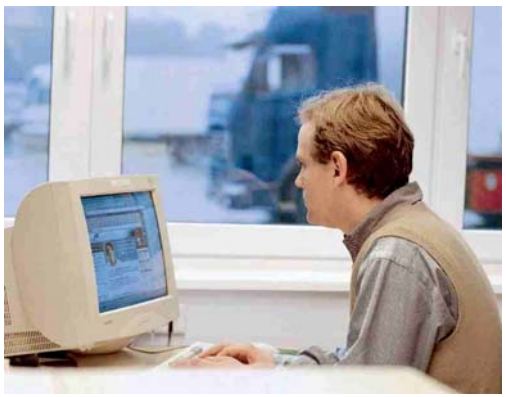
- installation of OBU, DSRC - module and antenna through authorized service-partners in Germany and neighbouring countries
- equipment is free of charge (payment of a deposit)
- input of PIN / weight / no of axles / tour / account
- OBU recognizes autonomously by means of GPS - data and road net whether the vehicle is on a toll road
- autonomous determination and storing of the toll
- autonomous sending of the charge-data to the toll collection center by GSM mobile communication

Booking System
Manual Booking

- route booking at terminals near highways
- approx. 3,500 booking terminals in Germany and neighbouring countries
- indoor / outdoor - terminals

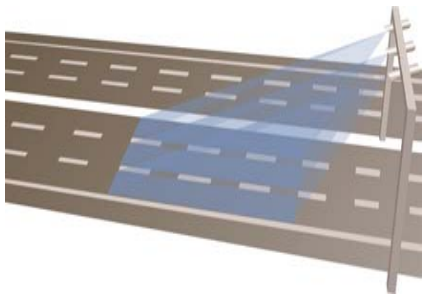
- input of vehicle-data, route-data and time of use
- issueing of booking-receipt
- storing of the booking-date in the toll collection centre

Booking System
Internet Booking



- registration and separate authorisation necessary
- access via user ID and password
- selection of language (English, German, French, Polish)
- input similar to booking terminal
- access to own registered vehicles
- printing of receipt with safety code (digital signature)

Enforcement



Automated Enforcement

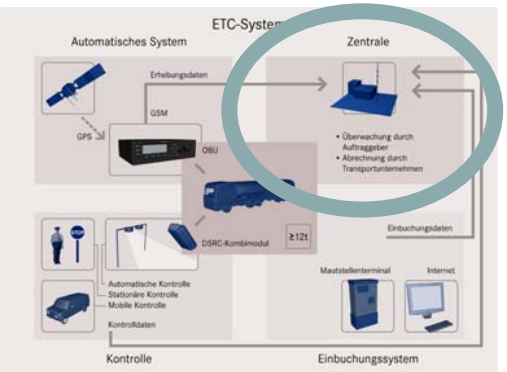
- without free flow interference
- 300 enforcement gantries
- enforcement gantries span the whole roadway
- Stationary Enforcement
    - based on Automated Enforcement
    - discovery of tolling / violating facts on highway site

Mobile Enforcement

- enforcement under free flow conditions,
- discovery of tolling / violating facts on highway site
- 300 Mobile Enforcement vehicles

Central Systems

Data management, Billing, User service Operating
Data protection, Surveillance and others



User service

- verbal and written information regarding usage and billing
- service / call centre - fax, e-mail, postal
- user service available daily 24 h

Data protection

- charging, storing, processing, transmission of data according to data protection laws e.g. cryptographic encoding of data

Surveillance

- transparency and trouble detection of ETC system
- improvement of efficiency / discovering of weaknesses

3. Toll Collect - Status

Status

- Toll Collect System has started successfully on January 1, 2005
  - System performance is very good
- User acceptance is good
  - Most users were well informed and prepared for the toll introduction
  - Some users "gambled" on successful system start and did not prepare themselves or their employees (no OBUs)
- Automatic booking most frequently used way to access the system
  - About 90% of all bookings done automatically
  - Toll Collect provided help to users with 5,000 booking assistants at strategic locations with terminal bookings

Usage Figures (1)

- Registered Companies
  - Currently 71,000 companies registered
  - + 6,000 since January 1
- On-board Units
  - 330,000 OBUs built into trucks
  - Number of orders has risen significantly since system start (currently 65,000 reservations)
- Bookings
  - 800,000 bookings per day (average)

Usage Figures (2)

- Non-conform users
  - First week: 8% of users failed to pay correct toll mainly in manual system
  - Second week: 3% non-conform users
  - Compared to phased out vignette system this is a huge success (about 20% of users failed to pay correctly or did not pay at all in the first month of operation)
- Money flow
  - First operational week (holiday) resulted in EUR 40m
  - Next weeks projected toll revenues at EUR 60-70m